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Parents' Executive Functions, Parenting Styles, and Oppositional Defiant Disorder Symptoms: A Relational Model*

Funciones ejecutivas de los padres, estilos de crianza y síntomas del Trastorno Oposicionista Desafiante: un modelo relacional

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ABSTRACT

The present study examined the role of mother's and father's executive functions (EF), warmth and harsh parenting, and child oppositional defiant disorder symptoms (ODD). A total of 100 families with preschool children participated. The mothers answered three questionnaires: EMBU, ECI-4, and the BRIEF; the fathers answered only the BRIEF. The analysis was done by testing two structural equation models (SEM). The results showed that both models had an excellent fit and presented a significant path from mother's EF toward harsh parenting; the second model presented a significant path from harsh parenting to ODD symptoms. Our findings are concluded in light of the importance of addressing parenting interventions to prevent further conduct/disruptive disorders.

Keywords

executive functions; parenting styles; harsh parenting; oppositional defiant disorder; mother executive functions.

RESUMEN

El siguiente estudio analizó el papel de las FE de la madre y del padre, el estilo de crianza y la sintomatología del TOD en los niños. Un total de 100 familias con niños en edades preescolares participaron en este estudio. La madre contestó tres cuestionarios: el EMBU, el ECI-4, y el BRIEF, mientras que el padre solo contestó su propio BRIEF. El análisis se realizó con el modelo de ecuaciones estructurales. Los resultados muestran que hay una trayectoria significativa de las FE de la madre hacia un estilo de crianza duro y severo, y esta relación continua significativa hacia la sintomatología de TOD. Nuestros resultados aluden a la importancia de las intervenciones en los estilos de crianza para prevenir el desarrollo de trastornos de conducta.

Palabras clave

funciones ejecutivas; estilos de crianza; estilo de crianza autoritario; trastorno oposicionista desafiante; funciones ejecutivas maternas.

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Parenting and Preschoolers

A large body of information on parenting practices in early childhood has been reported in the literature. Children at preschool years are becoming more independent but still need limits, supportive [falta sustantivo] and caretaking in a great amount of time (Chase-Lansdale, Wakschlag, & Brooks-Gunn, 1995). In recent decades, most of the research has been focused on the mother as the primary child caretaker; however, in the last three decades, the father has been included in family research (Calzada, Eyberg, Rich, & Querido, 2004; Flouri, 2010; Lansford et al., 2014; Verhoeven, Junger, Van Aken, Deković, & Van Aken, 2010). Olhaberry and Santelices (2013) have argued that the support of the father can contribute in a positive way to the family dynamic.

It has been suggested that a high quality of parenting (i.e. warmth parenting), which provides support and acceptance, develops prosocial relationships, empathy (Waller et al., 2014), and effortful control in children (Eisenberg et al., 2005; Karreman, Van Tuijl, Van Aken, & Deković, 2006). In contrast, negative parenting (i.e. harsh parenting), which involves inconsistent discipline, severe punishment, constant criticism, and failure to monitor, has been related to externalizing behaviors in preschoolers (Calzada et al., 2004; Gardner, 1989; Kroneman, Hipwell, Loeber, Kootand, & Pardini, 2011; Tung & Steve, 2013; Verhoeven et al., 2010). Children with externalizing behaviors are at risk of peer rejection, academic failure and involvement in constant conflicts with authorities (Olson, Bates, Sandy, & Lanthier, 2000).

Parenting and ODD Symptoms

Among externalizing behaviors, ODD symptoms have been found to be the most related with negative parenting (Deault, 2009). This finding is based on the use of both clinical (Calzada et al., 2004; Kroneman et al., 2011; Tung & Steve, 2013; Burke, Pardini, & Loeber, 2008; Verhoeven

et al., 2010) and normal samples to measure ODD symptoms (Burnette, 2013). On the other hand, positive parenting practices have been studied as the bidirectional relation between the parent and the child. For example, in a cross-lagged model, Waller et al., (2014), reported a negative relation between positive parenting rearing and ODD symptoms. Based on that, it is a possibility that positive parenting could have an inverse effect, promoting a protective mechanism of ODD symptoms.

According to Olson et al. (2000), harsh parenting on preschool children has important effects in later years and mostly predicts antisocial behaviors. They also reported a reciprocal influence between parents' practices and children's disruptive behavior, suggesting that negative maternal interactions with their child might have an effect at early ages. Given those approaches, it is important to explore a bidirectional relation between both parenting styles and ODD symptoms.

Parents' EF and Parenting

Theoretical approaches assert that parent cognitions have a direct effect on parenting practices (Chase-Lansdale et al., 1995; Deater-Deckard, 2014; Wilson, Gardner, Burton, & Leung, 2006). Deater-Deckard (2014) proposed a heuristic model of intergenerational transmission between parents and children. He suggested that executive functions (EF) work as a moderator of parents' emotional and behavioral reaction to their child's behavior. EF have been defined as a group of cognitive processes that are interrelated in order to achieve a future goal (Anderson, 2002). Some of the EF are working memory, shift, planning, attention, inhibition, emotional control, among others.

Cuevas et al. (2014) found that mother's harsh parenting was negatively associated with a minor deficit of EF. Similar findings have been reported on harsh parenting among mothers with deficits in working memory (WM) (Deater-Deckard, Sewell, Ptrill, & Thompson, 2011) and with low behavioral

inhibition (Feng et al., 2007). Gonzalez, Jenkins, Steiner and Fleming, (2012) reported that lower maternal sensitivity was associated with poorer spatial working memory and cognitive flexibility. Positive parenting has been also studied. Gonzalez et al. (2012) proposed a model examining the impact of maternal early experiences on maternal sensitivity through hypothalamic-pituitary-adrenal (HPA) function and EF in 89 mothers and their infants 2-to-6-years old. They tested four mediational path analyses where they found that parental stress (HPA function) and EF are mediators linking early experiences to parenting. Furthermore, Chico, González, Ali, Steiner, & Fleming (2014) compared teenage mothers against adults, to test if poor EF development, as it is at such early ages, could be associated with EF and mothering. All mothers were approximately at 4-6 months postpartum. As expected, teenagers performed worse than adults on tasks of cognitive flexibility and were less sensitive in their infant interactions.

Deater-Deckard, Wang, Chen and Bell, (2012) studied maternal EF, harsh parenting, and child conduct problems by testing 147 mothers of three-to-seven-year-old children. They found a relation between harsh parenting and child conduct problems only in mothers with a deficit of EF, highlighting the importance of the relations among those three variables.

Current Study

As summarized above, previous research has shown an important role of mother's EF in predicting harsh parenting. An important relation between harsh parenting and ODD symptoms in clinical and normal samples has also been reported. To gain a better understanding of parenting behaviors, this study focused on a further analysis of the abovementioned relations, with the addition of effects of father's EF and warmth parenting on ODD symptoms in a normal sample. The objective of this study was to analyze the relation between both parents' EF, harsh and warmth parenting, and ODD

symptoms. To do so, we analyzed two equation structural models. The first model was intended to confirm previous research findings on the relations between both parents' EF and warmth and harsh parenting. We expected to find a positive relation of EF with warmth parenting and a negative relation with harsh parenting.

In the second model, we added a bidirectional relation between parenting styles and ODD symptoms. As previous research results have suggested, we expected to see a bidirectional and positive relation to harsh parenting and a negative relation to warmth parenting. Theoretical approaches about bidirectional influences between children behaviors and parenting are well documented (e.g. Kiff, Lengua, & Zalewski, 2011); specially when it comes to maladaptive child behaviors, they elicit more negative parenting practices.

Method

Recruitment Procedure

The participants were part of a cluster sampling of public and private schools in Bages, (Catalonia, Spain). The schools were chosen based on their student population, and all parents were asked to participate. It was preferable to choose a school with more children than one with just a few. For this study, we chose all three to five years old children that attended the schools in the cluster.

Sample

A group consisting of 100 parents, 98 mothers, and 89 fathers, with preschool children (55 % boys, 44 % girls) falling between 3 and 6 years old (mean = 3.91 years old, SD = .85) participated in this study. Mother's mean age was 34.94 (SD = 4.68) and father's mean age was 37.74 (SD = 5.09). Most of parents were living together (85.5 %), followed by a minority of divorced parents with a new partner (4.2 %), divorced parents without partner (3.1 %), single fathers (2.1 %),

and single mothers (1 %). Regarding the parents' level of education, 29.1 % of mothers and 38.94 % of fathers completed primary school, 31.2 % of mothers and 36.84 % of fathers completed high school, and 39.5 % of mothers and 24.2 % of fathers had a college degree.

Procedure

Permission to carry out this study was obtained from Serveis Territorials d'Ensenyament de la Catalunya Central (Govern de la Generalitat de Catalunya). The research group contacted the schools and invited the parents of all the schoolchildren to take part in the study. Those who agreed were given questionnaires and release of informed consent forms by the research group. The parents completed the questionnaires at home and then returned them, along with the signed informed consent forms, through the teachers.

Measures

Sociodemographics

The Hollingshead questionnaire (Hollingshead, 1975) was used to collect sociodemographic data.

Parenting Styles

The EMBU-P (Perris, Jacobsson, Lindström, Von Knorring, & Perris, 1980) Spanish version for adults (Arrindell et al., 1998) was used to measure parenting styles. The mother was asked to answer this questionnaire. Scores were obtained on a four-point Likert scale (1 = never, 2 = sometimes, 3 = often, and 4 = always). The questionnaire consisted of 52 items in four dimensions: emotional warmth, rejection, attempts at control, and favoring subject; we used the first two dimensions. Emotional warmth measured parental acceptance and physical/verbal/emotional affection through 17 items. Some items under warmth parenting were: 'You have shown that you are happy with your child'

and 'You helped your child when he/she had a difficult task in front of him/her'. Rejection was chosen to measure harsh parenting because it evaluates parental physical punishment, hostility, disrespect, and inconsistent discipline. This dimension consisted of 13 items; for example: 'You have treated your child in such a way that he/she felt ashamed', 'You have beaten your child', 'You have been too strict with your child'. Internal consistency reliability for warmth and rejection goes between 0.93 and 0.92 α Cronbach.

ODD Symptoms

The Early Childhood Inventory (ECI)-4 Parent and Teacher Checklist (Sprafkin & Gadow, 1996) was used. This behavioral scale based on the DSM-IV rates 17 emotional and conduct disorders in children from 3 to 6 years old. Mothers answered this questionnaire. Each scale is based on four points, indicating how often the symptoms were observed in the child (0 = never, 1 = sometimes, 2 = often, and 3 = very often). The dimensions of the ECI-4 can be evaluated by criteria or severity. We evaluated by severity to come up with a concrete dimensional variable for measuring ODD symptoms. Cronbach alpha values range from 0.62 to 0.94 (Viñas et al., 2008).

Parents' EF

The Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A) (Spanish version by Roth, Isquith, & Gioia, 2005) was used to measure adults' EF in their daily lives. The BRIEF-A consists of 75 items that are scored on a scale from 1 to 3 (1 = never, 3 = always). It evaluates nine clinical scales: inhibition, shift, working memory, monitoring, planning/organization, initiative, task monitoring, emotional control, and organization of material. Considering previous researches (Cuevas et al., 2014; Deater-Deckard et al., 2011; Feng et al., 2007; Gonzalez et al.,

2012), we tested only the first three scales to confirm similar results. Both mothers and fathers were asked to answer this questionnaire. The internal consistency ranged from 0.93 to 0.96 Cronbach coefficients.

Analysis

Analysis on the descriptive data and correlations were conducted with SPSS version 19.0. It was decided to analyze these two models using structural equation modeling (SEM) because it allows to compare the relations between all variables at the same time. The advantage over the regression models is that SEM models are able to deal with measurement error (Iacobucci, 2009).

The SEM was analyzed by using Mplus version 6.11 (Muthén & Muthén, 1998-2010) with the maximum likelihood method of estimation. To determine the adjustment of the SEM models, the following adjustment coefficients were used: χ^2 statistics, comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). A model is considered to have good adjustment when the coefficients meet the following criteria: $\chi^2 \leq ns$, TLI and CFI of 0.9 (acceptable) and above 0.95 (excellent) (Hox & Bechger, 1998), RMSEA cutoff ≤ 0.06 (Hu & Bentler, 1999), and SRMR ≤ 0.08 . The SEM technique have been suggested for analysis with large and small size samples (Hox & Bechger, 1998; Iacobucci, 2009), the minimum size sample suggested have been over 100 participants (Iacobucci, 2010).

Results

Table 1 shows descriptive variables between EF for both parents. Table 1 shows the correlations between ODD symptoms, harsh parenting, warmth parenting, and mother's and father's EF. ODD symptoms had a significant correlation with harsh parenting ($r = 0.56, p < 0$) but not with warmth parenting ($r = 0.01, p < ns$).

ODD symptoms also had a significant correlation with father's inhibition ($r = 0.26, p < 0.05$), as well as mother's working memory ($r = 0.35, p < 0$) and inhibition ($r = 0.3, p < 0.01$). Harsh parenting was correlated with all three mother's EF dimensions but not with father's EF. Furthermore, warmth parenting was not significantly correlated with either parent's EF. There was a significant correlation between all of the EF of the parents except for mother's inhibition and cognitive shifting of the father.

Table 1

Summary of means, Standard Deviations and correlations for scores on ODD symptomologies, parenting styles and both parent's EF

Scales	1	2	3	4	5	6	7	8	9
1. ODD	-								
2. Harsh parenting	0.56***	-							
3. Warmth parenting	0.01	-0.21	-						
4. Inhibition-Mother	0.3**	0.29*	-0.06	-					
5. Shift-Mother	0.16	0.35***	-0.05	0.25*	-				
6. WM-Mother	0.35***	0.54***	-0.07	0.41***	0.55***	-			
7. Inhibition-Father	0.26*	0.22	0.36	0.25**	0.4**	0.49***	-		
8. Shift-Father	0.12	0.21	-0.16	0.18	0.3**	0.31**	0.56***	-	
9. WM-Father	0.12	0.17	-0.08	0.3**	0.41***	0.51***	0.63***	0.7***	-
M	1.57	16.77	58.88	10.46	8.18	9.77	11.15	8.08	10.36
SD	0.42	3.11	9.36	1.91	1.9	2.12	2.64	2.04	2.43

Note. WM = Working memory; ODD = Oppositional Defiant Disorder.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Figure 1 shows the first model, which had an excellent adjustment ($\chi^2 = 18.36, df = 16, p < 0.302$, CFI = 0.98, TLI = 0.98, SRMR = 0.49, RMSEA = 0.03). Standardized betas are shown on the model. The only significant path was from mother's EF toward harsh parenting ($\beta = 0.87, p < 0$).

Figure 1

Structural equation modeling of the relation between both parent's EF and both warmth and harsh parenting styles. Straight lines denote significant relations. Dashed lines denote non-significant

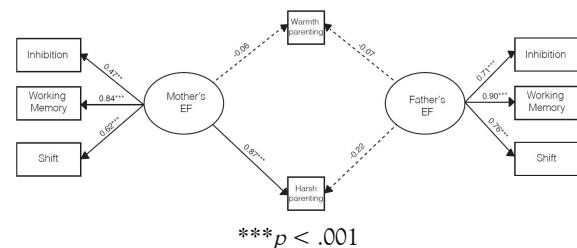
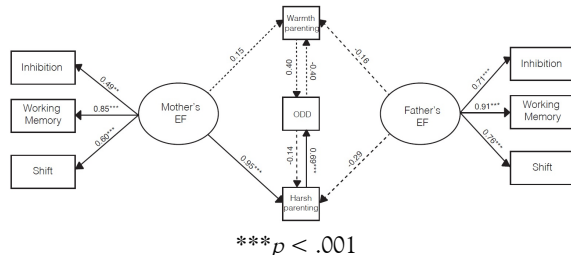


Figure 2 shows the second model, which also had an excellent fit ($\chi^2 = 23.991$, $df = 21$, $p < 0.29$, CFI = 0.98, TLI = 0.97, SRMR = 0.5, RMSEA = 0.03). As the previous model, standardized betas are shown on the paths. There was a significant path between mother's EF and harsh parenting ($\beta = 0.95$, $p < 0$) and a trajectory from harsh parenting toward ODD symptoms ($\beta = 0.69$, $p < 0$). No significant difference was found in the paths from either parent's EF toward warmth parenting or from ODD symptoms to harsh parenting.

Figure 2

Structural equation modeling of two latent and three observed variables. Rectangles denote responses of both parenting styles and ODD symptoms. Ellipses denote latent variables for both parents' EF. Straight lines indicate significant relations. Dashed lines denote non-significant. ODD = Oppositional Defiant Disorder



Discussion

In this study, we tested two models with the objective of finding relations between parents' EF, parenting styles, and child ODD symptoms. Both models showed a path from both parents' EF toward warmth and harsh parenting; the second model considered the bidirectional effects of parenting styles and ODD symptoms. We expected to find effects of both parents' EF on their parenting styles, but it did not happen. The main finding was a significant path from mother's EF toward harsh parenting, which affected the ODD symptomatology. Neither mother's nor father's EF had a significant path toward warmth parenting; father's EF also showed no path toward harsh parenting.

The first model indicated that mother's EF had a strong and significant path toward harsh parenting, whereas father's EF did not predict any parenting style. We were expecting to find a relation between EF and both parenting styles (i. e. warmth and harsh parenting). However, those results were not found when it comes to father EF and a warmth parenting style.

Previous research has reported similar findings on mother's EF and harsh parenting (Deater-Deckard et al., 2012; Cuevas et al., 2014), citing that mothers were evaluated only because of their major involvement in childcare. Our results point to the importance of comparing mothers'—and not fathers'—EF. One possible explanation for the effect of mother's EF on harsh parenting could be stress. According to Lansford et al. (2014), having a large number of stressful events requires better executive functioning (Lansford et al., 2014). Calzada et al. (2004) reported that mothers tend to experience more parental stress than fathers do. Given this result, it is possible that mother's EF showed a strong relation with harsh parenting because of variables such as household chaos and other stressful events, which have been reported as mediators of such association (Deater-Deckard et al., 2012; Cuevas et al., 2014). Thus, it is important to consider stress in future research so as to compare both parents' measures (Cabrera, González, & Guevara, 2012).

The strong effect between mother's EF and harsh parenting opens up a discussion about how parent-cognitive-function might be involved on their own rearing practices. First, it is surprising that warmth-parenting practices did not seem to be related to parent EF as we would expected. This could mean that rejection and emotional warmth are not necessarily opposite dimensions divided into positive and negative parenting practices, but different dimensions of parenting styles.

On another point, it is possible that mothers reporting harsh parenting upbringing might be the ones that could report higher levels of executive dysfunction, but there is not an inverse effect, where the mothers reporting good EF

performance are the ones reporting high levels of warmth.

After the second model was tested, we added to the first model ODD symptoms. We were expecting to find a bidirectional effect between parenting styles and ODD.

The main finding of this model was based on the significant path from mother's EF to harsh parenting and then toward ODD symptoms. However, we did not find a bidirectional relation between parenting styles and ODD symptoms.

According to the relation between mother's EF and harsh parenting, previous research has reported similar findings (Burnette, 2013; Tung & Steve, 2013; Verhoeven et al., 2010). In particular, Verhoeven et al. (2010) found maternal behavior to be a more important predictor of child externalizing behaviors compared to paternal behavior.

On the other hand, we did not find a reciprocal relationship between parenting styles and ODD symptoms, as reported by Burke et al. (2008) and Olson et al. (2000). Instead, we found a significant path only between harsh parenting and ODD symptoms. It is possible that we did not find such reciprocal relationship because we used a nonclinical sample, as did the other two studies. As Gardner, Ward, Burton and Wilson (2003) suggested, a mother's negative attributions toward her child may be a cause of child behavioral problems. It could mean that strong symptoms of ODD could affect parenting practices in a major way; however, such bidirectional relation cannot be found in a normal sample.

As suggested by the model, we hoped to find a relation between warmth parenting and ODD symptoms, but that did not happen. Olson et al. (2000) and Eisenberg et al. (2005) found such relations in longitudinal studies. Specifically, Olson et al. (2000) studied children from 24 months to 17 years old and found that children at risk of externalizing behavior scored low on warmth and affective enjoyment with the mother. Eisenberg et al. (2005) worked on a longitudinal study of three waves: first, when the children were 3 years old; then, two years later; and finally, six years later. They found that warmth parenting

was a predictor of child externalizing problems; this was mediated by child effortful control. This prediction was only found nine years after the first measure, not two years later when children were in preschool years. Comparing that finding with ours might enhance the supposition that positive parenting could have an effect over the long term and not in a short term, which, however, needs further research to be confirmed.

Conclusions

This family study provides information about the relations between parents' EF, parenting styles, and ODD symptomatology. The major finding is based on the relation between mother's EF and harsh parenting and its effect on child ODD symptomatology. Lansford et al. (2014) suggested that there is a need to eliminate parents' violence toward children, citing the common use of harsh physical and nonphysical forms of discipline. Our findings support the importance of preventing harsh parenting, especially in early childhood, a stage in which it is a strong predictor of antisocial behavior in later years (Rhee et al., 2012).

Limitations and Future Directions

This study has a number of limitations. First, it is a cross-sectional study that focuses on relations between variables. As discussed previously, a longitudinal study is necessary to determine whether ODD symptoms during preschool years can develop into conduct disorders because of harsh parenting or if children develop cognitive deficits as reported before (Araujo, Jané, Bonillo, & Capdevilla, 2014). Second, according to Deater-Deckard et al. (2012), environmental stress is an important mediator variable for mothers; controlling environmental stress at home or personal stress for both parents could be a determinant in relating the effects on EF or harsh parenting. As a future direction, it could be useful to assess prenatal and perinatal risk factors because of the major development that occurs at those stages (Latimer et al., 2012). Likewise, comparing our findings to those from a clinical

sample can help determine bidirectional effects between parenting styles and ODD symptoms.

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Notes

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